

Before the
Federal Communications Commission
Washington, D.C. 20554

MM Docket No. 87-121

In the Matter of

Amendment of Part 73 of the
Commission's Rules to Permit
Short-Spaced FM Station Assignments
by Using Directional Antennas. RM-6015

REPORT AND ORDER

Adopted: December 12, 1988; Released: February 22, 1989

By the Commission: Commissioner Quello dissenting in part and issuing a statement; Commissioner Dennis issuing a separate statement.

INTRODUCTION

1. The Commission herein adopts new rules permitting an applicant for commercial FM facilities to request the authorization of a transmitter site that would be nominally short-spaced to the facilities of other co-channel or adjacent channel stations, provided the service of those other licensees is protected from interference in accordance with well established criteria. The necessary protection may be afforded by taking advantage of terrain elevation in the direction of the short-spaced station(s), by an appropriate reduction in operating facilities (power and/or antenna height), by use of a directional antenna, or by any combination of these means. The maximum amount of short-spacing is limited by the amount of separation specified for the next smaller size station class. However, because of the Commission's limited FM application processing resources, permissible short-spacing initially will be limited to 8 kilometers (5 miles). No change is made in the current FM channel allotment process, under which proposals for new channel allotments must meet minimum distance separations with respect to other co-channel and adjacent channel stations. Also, no change is made with respect to minimum distance separation requirements for I.F.-related stations.¹

BACKGROUND

2. On April 27, 1987, the Commission adopted a *Notice of Inquiry (Inquiry)* in the above captioned matter, which sought to explore the possibility of stations using reduced facilities or directional antennas at short-spaced transmitter locations.² It noted that the FM service has developed into the largest and most popular aural service, and that future approval of new or modified facilities might depend on greater flexibility in the selection of transmitter sites, some of which might be unable to meet the current distance separation requirements set forth in the Rules.³ Accordingly, it sought new information about the technical characteristics of directional FM antennas and their

potential utility in allowing licensees to short-space their transmitters to some degree, while at the same time providing full protection to the service of other co-channel and adjacent channel licensees. It emphasized that no change in the current allotment process (which requires minimum distance separations) was contemplated, and that the use of directional antennas in the station assignment process would be intended merely to provide applicants with some additional flexibility in antenna site selection.

3. Comments received in response to the *Inquiry* supported our proposal, with 28 of 35 respondents favoring some form of short-spacing provision for FM station assignment. These commenters also expressed confidence in contour protection as a valid alternative to the current distance separation requirements, and in the ability of directional antennas to provide predictable levels of signal attenuation in needed directions. However, some concern was expressed that imprecision in current signal propagation methodology could increase interference levels in the FM service. The majority of commenters affirmed the view that the spacing requirements should be retained in the commercial FM channel allotment process. After considering all of the comments, the Commission concluded that the matter warranted further investigation.

4. Just before the adoption of the *Inquiry*, the Commission received a petition (RM-6015) filed by Hammett & Edison (H&E), consulting engineers, requesting amendment of Section 73.316 (FM antenna systems) to more clearly define the performance characteristics of FM broadcasting antenna systems.⁴ The concerns raised by H&E were included by reference in a subsequently adopted *Notice of Proposed Rule Making (Notice)* adopted on February 25, 1988.⁵

5. The *Notice* reiterated our intention to explore the use of directional FM antennas for short-spacing only during the station assignment process (*not* during the allotment process), as a means of providing greater flexibility in transmitter site selection. It noted that site restrictions encountered by applicants because of FAA clearance difficulties, government ownership and restrictions on use of desirable sites, as well as other environmental, economic and coverage concerns, could require the use of a short-spaced antenna site in conjunction with a directional FM antenna to ensure the public interest while at the same time providing the required protection to the facilities of other licensees.

6. Accordingly, it proposed that the maximum omnidirectional facilities, rather than actual operating facilities of stations and vacant channel allotments, be afforded protection as currently implied in the Rules, but that in the future, licensees employing directional antennas would be afforded protection only to their actual contours. The contour protection criteria recommended were similar to those currently used in the non-commercial educational FM service. An ancillary question raised was whether Class B and B1 stations in the non-reserved portion of the FM band should use, for contour protection purposes, the same protected contour as the other classes (A, C, C1 and C2) of stations. (Currently, these Class B and B1 stations provide a weaker signal along their protected contour than the other classes of stations.) It also sought comment on whether there might be certain conditions under which a licensee might want to accept some interference to the normally protected contour.

7. Other matters raised in the *Notice* concerned limits on FM antenna directivity, methods for measuring directional antenna patterns, installation procedures, and the relationship between the horizontal and vertical radiation patterns. The *Notice* indicated that processing applications involving directional FM antennas on a larger scale would require the implementation of an automated interference analysis program (current directional stations have been authorized only after tedious manual analysis which would be impractical in any larger context). To facilitate such analysis, it proposed that antenna directivity information be submitted in tabular form, and asked for comment on what number of radials data should be submitted in order to properly define directionality. It also discussed three different methods of computing the height above average terrain (HAAT) that could be appropriate in calculating interference levels on a more directionalized basis. Lastly, because of the possibility that many applications involving the use of directional antennas could seriously impede overall application processing, the *Notice* asked whether eligibility for such operation should be restricted in some way.

SUMMARY OF COMMENTS

8. The comments filed in response to the *Notice* were, in the main, supportive, with 29 of 42 respondents generally approving our proposals. They are summarized below under general headings related to the principal policy questions raised in the *Notice*.

Is the use of contour protection an appropriate alternative to spacing requirements?

9. The National Association of Broadcasters (NAB), the Association of Maximum Service Telecasters (MST), the Association for Broadcast Engineering Standards (ABES) and several other commenters insist that FM station short-spacing will result in overcrowding of the FM radio spectrum and lead to increased adjacent and co-channel interference problems. The AM radio service is cited as an example of the failure of contour protection as a station assignment method. On the other hand, the Association of Federal Communications Consulting Engineers (AFCCE), the Massachusetts Class A Broadcasters Association (MCABA) and many others favoring our proposal, express confidence in contour protection, citing its success in the non-commercial service, and affirm that short-spacing for the limited purpose of increased flexibility in antenna site selection could be accomplished without increased interference potential, and within the framework of the current Table of Allotments.

Should the FCC authorize short - spaced stations, provided sufficient protection is afforded the service of other licensees?

10. Most of the comments support our proposal to allow licensees site selection flexibility involving short-spacing provided that protection is afforded the service of other licensees. The proposal generally is seen as a logical extension of current rules and policies which effectively have prevented interference between short-spaced facilities. The use of directional antennas is viewed as a particularly attractive alternative to power or antenna height reduction, which has also been used to afford protection

in cases where short-spacing has been necessary. The utility of directional antennas in placing a good signal over areas of demographic interest also was noted. AFCCE further commented that while it may be desirable, in the future, to modify both the field strength estimation routine and the desired-to-undesired signal ratios to more accurately represent real world propagation effects and receiver performance, it supports the proposed use of the protected contour and interfering contour values presented in Appendix C of the *Notice*.

11. Comments from NAB, Shamrock Broadcasting Corporation, Capitol Broadcasting Corporation and Infinity Broadcasting Corporation, however, suggested that the protection method utilized by the current grandfathered short-spaced stations should be implemented instead of the proposed contour overlap prohibition method. Under this method, which is specified in Section 73.213, grandfathered short-spaced stations are not allowed to make modifications that would move their 1 mV/m contour closer to the 1 mV/m contour of other short-spaced stations. To apply this method to new short-spaced facilities would restrict their service to within a projected 1 mV/m contour of a maximum facility station from the reference coordinates or some other appropriate non-short-spaced site. Capitol and Infinity believe that this approach would be more convenient to administer than the proposed interference protection signal ratio method. In regard to another pertinent contour consideration, the comments agree with the current requirement that all stations (including short-spaced facilities) should provide, at minimum, a 3.16 mV/m (70 dBu) signal over the station's allotted community of service.

What protection should be afforded short - spaced stations using directional antennas?

12. This subject was not addressed extensively in the comments. Karl D. Lahm, P.E. (Lahm) expressed the opinion that facilities which become voluntarily short-spaced should be protected from interference based on their actual facilities within the sector where restriction of power is necessary to preclude interference. Elsewhere, he believes maximum facilities should be assumed and full spacing should be applied. Shamrock Broadcasting, Inc., Infinity Broadcasting Corporation and Capitol Broadcasting Corporation, in virtually identical comments, believe that short-spaced stations should be protected as though they were operating with full facilities from the reference coordinates of their allotment, or from their existing site (in the case of stations seeking modification of authorizations to short-space). This is seen as facilitating the "go/no go" characteristics of the existing, separation-based regulatory scheme and avoiding the more burdensome processing procedures associated with contour protection. Also, it has the advantage of assuring that voluntarily short-spaced stations would not be prevented, by encroaching stations, from modifying or enhancing their facilities in fully spaced directions at some future time.

Should the signal strength of the protected contour for Class B and B1 stations operating in the non-reserved portion of the band be the same as that for all other classes of FM stations?

13. As to the question of what signal strength is appropriate for the protected contour in the case of Class B and Class B1 stations operating on FM Channels 221-300, some of the commenters express support for protecting the 60 dBu (1 mV/m) contour, as is the case for all FM stations operating on FM Channels 200-220 (known as the "reserved" or non-commercial educational portion of the FM band), and as proposed in the *Notice* for all other classes of stations. Class A station licensees, in particular, support this idea, because they believe it would allow them greater flexibility to upgrade to higher classes. The Massachusetts Class A Broadcasters Association (MCBA) suggests that the Commission should establish this single protected contour for all FM stations because it is the level to which a majority of the country's FM stations are presently protected, and thereby, constitutes a de-facto standard. MCBA further notes that paragraph 73.512(a)(1) of the Rules specifies the 60 dBu contour per Section 73.509 for all classes of commercial FM stations as the contour which must be protected by non-commercial Class D stations operating on non-reserved channels.

14. On the other hand, most licensees, consultants, and other representatives of Class B and B1 stations strongly opposed the use of the 1 mV/m (60 dbu) protected contour on the grounds that the size of their protected areas would be significantly reduced. AFCCE notes that because the current minimum separation requirements for non-reserved band FM stations nominally protect the 0.5 and 0.7 mV/m contours, for Class B and B1 stations respectively, it would be appropriate to maintain these values for the purposes contemplated in this proceeding.

Should the method for computing the height above average terrain (HAAT) for FM stations using directional antennas be changed?

15. By a small margin, commenters favor the method of calculating HAAT by averaging the antenna heights along the azimuths of the arc subtending the protected contour, and along radials located at 10 degree intervals therein. The consensus is that this method would be considerably more accurate than the traditional method (which considers the elevations along eight radials extending from the proposed station at azimuths which are multiples of 45 degrees), or by simply considering the terrain elevation along the direct path between the proposed station and the station that would be short-spaced.

Under what circumstances, if any, should FM station licensees be permitted to accept interference to their service?

16. There is considerable agreement among the comments on the issue of whether short-spaced stations should be allowed to receive or negotiate the acceptance of interference. For example, NAB, which opposes the *Notice* in general, and Greater Media, Incorporated, which supports it, both conclude that the Commission should not permit interference by private agreement. Other commenters note that although there are a few anomalies in the existing table of required distance separations, these should not be used as a basis for allowing such

interference on request. Only in special cases should the Commission consider the granting of received interference as a valid option. Susquehanna Radio Corporation suggests that the Commission move very slowly and with great caution on this matter. Susquehanna believes that it may become necessary to allow the acceptance of some interference so that maximum benefits may occur in some areas, but any such interference should be kept to a minimum and not left to the discretion of the stations involved.

What technical standards and methods of certifying the performance of FM directional antennas are appropriate?

17. The comments also contain a considerable amount of discussion on technical considerations for the use of directional antenna systems, in general, and for the purpose of short-spacing. Some of the issues raised address methods of determining accurate antenna radiation patterns. When providing measured antenna radiation patterns, the accuracy of those measurements plays a vital role in determining prohibited contour overlap compliance. The commenters submitted various arguments in support of, or in opposition to, the ascertainment of theoretical and measured antenna signal patterns in real world environments. For example, technical and engineering consultant Doug C. McDonell suggests that specific rules should be adopted to provide for routine maintenance of an authorized directional FM pattern and include yearly airborne measurement of the radiated power at 360 degrees around the transmitter site. Susquehanna Radio suggests that short-spaced directional antennas be designed in such a fashion that the supporting structure can be drastically altered or electrically removed without upsetting the pattern. Susquehanna believes that only "panel antennas" or total tower screening should be acceptable for short-spaced directional antennas.

18. In its support of the *Notice*, AFCCE also submitted extensive discussion concerning antenna radiation pattern accuracy. AFCCE reports that when data is entered into a computer program to calculate contour position, an antenna with a specified measured pattern accuracy of plus or minus a fraction of a dB can be tailored to produce an predicted interference contour that will fit with assurance of no undesired contour overlap. However, an antenna with a measured pattern with less accuracy cannot achieve as close a fit, and therefore, will require a suitable clearance buffer zone. AFCCE suggests it should be the responsibility of the manufacturer and individuals making the antenna pattern measurements to certify the accuracy of such measurements. AFCCE further reports that when full size antenna pattern measurements are made, the accuracy is totally dependent upon the accuracy of the range and the equipment used to make those measurements. Thus, AFCCE believes that the manufacturer must be able to certify that the measured scale model pattern for a given antenna is accurate within a certain dB limitation compared to the actual pattern that will be achieved by the full scale antenna that is to be built.

19. Moreover, AFCCE believes that it is imperative that any full size or scale model antenna and its supporting structure be a precise representation of the intended final structure to assure pattern measurement accuracy. Even after mounting the antenna on the supporting structure, AFCCE states that there is the potential for changes on

the supporting structure within the aperture of the antenna which may interact with the antenna elements and modify the resultant horizontal plane directional pattern. AFCCE believes that panel antennas surrounding a triangular or square cross-section supporting structure, which have a high degree of isolation from the supporting structure, will be relatively immune from changes on the supporting structure behind the panels. While ABES opposes the concept of routine short-spacing, but does support the use of directional antenna systems in general, it also expresses similar concerns about the effects of antenna supporting structures. ABES, therefore, recommends additional proof-of-performance requirements for directional antenna applicants to insure operational integrity of the installed antenna system.

20. While several commenters have firm opinions and recommendations concerning the antenna pattern representation, most indicated that further study is needed before any conclusive determination could be reached on whether to relax the 15 dB maximum-to-minimum antenna radiation pattern ratio limitation. The commenters also expressed nearly the same conclusion on the related matter of antenna gain rate of change (the 2 dB per 10 degrees of azimuth limit which is currently applied as a condition of the permit of many directional FM stations), and whether this standard should be applied to all FM directional antenna systems.

21. Other technical issues, such as treatment of the vertical radiation pattern relative to the horizontal antenna pattern, specificity of application filing requirements in describing the antenna radiation pattern relative field strength at prescribed periodic azimuth intervals, establishment of applicant categories for accepting filings in consideration of the Commission's processing resources, establishment of a method to determine accurate HAATs in the direction of protected allotments and stations, IF protection standards, and propagation curves, elicited a range of suggestions, none of which were sufficiently supported to justify any change at this time.

DISCUSSION

22. Our intention in this proceeding is simply to afford FM applicants and licensees some flexibility in the selection of transmitter site by permitting a limited amount of short-spacing to other co-channel and adjacent channel stations, by taking account of the effect of such factors as height above average terrain (along the pertinent radials), directional antennas and reduced operating facilities to afford requisite protection to existing and allotted coverage areas. We recognize now that the *Notice*, by failing to specify any limits on such use, has prompted some suggestions that go considerably beyond what we had envisioned.⁶ At the same time, it has elicited considerable opposition from those who see no limit to its potential use. Accordingly, as discussed below, we are taking what we believe is a conservative approach toward the implementation of contour protection, directional antennas and the short-spacing they make possible in the commercial FM service. Because certain non-commercial, educational stations are subject to the requirements of Section 73.207, those stations are necessarily included in the changes adopted herein.

Contour protection as an alternative to distance separation requirements

23. Contour protection lies at the heart of this proceeding, and because it is used (and has been used for many years) in the non-commercial educational FM broadcast service, we assumed that there would be little question as to its validity as a station assignment methodology. However, concerns were raised by the commenters as to whether a contour protection based assignment system is desirable in the non-reserved band, and whether good quality FM service can be maintained under such a system. Thus, before our discussion can proceed to the consideration of short-spacing rules and related matters such as directional FM antenna performance, it is necessary to address these concerns regarding contour protection.

24. Several of the commenters allege that contour protection is not an adequate substitute for the distance separation requirements currently applicable to the various classes of FM stations in the non-reserved band. This view is rebutted by others, who point out (as we noted in the preceding paragraph) that contour protection has long been used in the reserved portion of the FM band with excellent results.

25. Nevertheless, most of the arguments against contour protection are based on claims that it is fundamentally inferior to the distance separation requirements. For example, some of the commenters prefer the current distance separation requirements over contour protection as a station assignment method because stations authorized pursuant to the minimum spacing requirements are afforded protection to the full facilities for their class. Thus, stations can begin operation with reduced facilities initially and upgrade at a later date without exceeding the interference limits that protect co-channel and adjacent channel stations. These commenters also argue that applying distance separation requirements is administratively less complex than contour protection. Lastly, several commenters impute to contour protection the interference levels which exist in the AM service, and they argue that a similar result would afflict FM if the use of contour protection were to be expanded into the commercial portion of the FM band.

26. We do not find these arguments persuasive. First, under the short-spacing rules adopted herein, all existing fully spaced stations will continue to be afforded protection based on the presumed use of the maximum ERP and reference HAAT for their station class. Consequently, the upgrade potential for the vast majority of stations will be unchanged.⁷ We will, however, protect only the actual facilities of the stations that apply for short-spaced locations under the new rules.⁸ Thus, the upgrade potential of stations applying for short-spaced locations under these new rules will depend largely on the spacing and facilities of subsequently authorized stations. We believe that this potential limit on the ability to upgrade will be considered as an acceptable trade-off to permittees or licensees that cannot obtain a fully spaced antenna site, or who for some other reason desire a short-spaced antenna site. We will merely permit licensees to weigh the advantages and disadvantages associated with short-spacing under these new rules, and to base their applications upon what they believe to be their best interest.

27. We agree with the commenters that preparing and processing applications involving contour protection are more complex than preparing and processing those con-

forming to the separation requirements. However, we expect to be able to process such applications adequately by following, in large part, the current assignment policies applicable to non-commercial educational FM stations in the reserved band. Insofar as the impact on applicants is concerned, we note that the burden of the necessary additional showings will fall voluntarily upon only those applicants expecting an appropriate benefit.

28. Arguments against contour protection based on analogies involving the AM broadcast service also appear inapplicable, as are allegations that directional antennas will lead to the "AM-ization" of the FM service. First, the interference problems characteristic of the AM service today are not the result of contour protection, *per se*. In fact, daytime groundwave service is based on contour protection and has proven to be very effective. It is the nighttime AM service with its attendant skywave interference from multiple sources that has proven so troublesome. However, the wide variability that is characteristic of nighttime AM propagation rarely afflicts the FM service. Other factors (*e.g.*, bandwidth limitations, spectrum noise levels and receiver design characteristics) also contribute to the AM problem. We believe that these other factors, and not contour protection, are the principal causes for erosion of signal quality in the AM band. We have no reason to believe that the further application of contour protection in the FM service will have any adverse effects.

29. Finally, we wish to address the argument that contour protection is inherently inferior to distance separation requirements in a mature, more heavily populated service. It should be noted that contour protection takes into account the variability of the terrain surrounding stations, whereas the separation requirements are based on average terrain assumed to be uniform in all compass directions. For example, using separation requirements, two FM stations located in the relatively flat terrain of southern Florida must be separated by the same distance as two identical stations located on the sides of mountains in West Virginia. Obviously, this failure to account for variations in the height of terrain means that the separation requirements sometimes overprotect, and at other times underprotect, FM service. The principal advantages of separation requirements are simplicity of administration (on a "go no-go" basis), and producing a more even distribution of assignments. However, in a mature service, both of these advantages are less important than in the early phases of its development.

Short - spacing and the use of directional antennas

30. The majority of the comments also affirm our belief that if we routinely permit an applicant to seek authorization of a transmitter site that involves a modest amount of short-spacing, provided appropriate protection is afforded to all other assignments, applications, and allotments, greater flexibility in system design and a higher quality of service will result. The record demonstrates that licensees who are or who anticipate having problems in finding suitable antenna sites, as well as Class A licensees seeking any means of becoming more competitive with the higher classes of stations, support the proposal.

31. We note that several of the opposing comments allege that the Commission's propagation curves are inaccurate. In this regard we must point out that these same curves and methods were also used to develop many of

the current spacing requirements and are employed daily in making non-commercial educational FM assignments. Some commenters also continue to express concern that we will attempt to expand the use of contour protection at a later date by applying it in the allotment process. However, we reiterate that we do not intend to do so. Clearly, that is not the proposal at issue here. Accordingly, we conclude that these concerns do not warrant our terminating or delaying this proceeding. On the contrary, the majority opinion is that sufficient information and policy considerations exist which warrant our adoption of rules in this matter at this time.

32. However, because the technical record in this proceeding does not clearly indicate the fullest extent to which FM directional antennas could be employed, we conclude that at this time, use of directional antennas should be authorized cautiously. Therefore, we have decided that, in general, stations should not be authorized at locations that do not meet, as a minimum, the required co-channel and adjacent channel spacings applicable to the next lower class of station.⁹ In other words, short-spaced locations will be allowed, but only to the extent that would be feasible if the stations were to operate with the approximate minimum facilities permitted their class. The exact distances involved are given in a table in new Section 73.215. Licensees will continue to be required to provide the prescribed principal city coverage (70 dBu) over their community of license and to preserve their service from interference.

33. We believe the limited amount of short-spacing we are herein permitting will afford applicants with a genuinely helpful amount of flexibility in antenna site selection, while effectively precluding large short-spacings that would require extremely directionalized antenna patterns that may be difficult to maintain on a continuing basis. Moreover, these rule changes enable us to discontinue granting waivers of Section 73.207 for co-channel and adjacent channel short-spacing.¹⁰ Henceforth, applications involving short-spacing will routinely be required to protect the facilities of other licensees pursuant to similar contour protection criteria currently used in the non-commercial service.¹¹ This decision will permit an average (for all classes of stations) maximum co-channel short-spacing of 26 kilometers (16 miles), or about a 14% reduction in the current spacing requirements.¹² However, for individual classes the reduction would vary significantly, with lesser reductions being permitted the higher classes of stations.

Protection to be afforded to fully spaced and short - spaced stations

34. The comments generally affirm the proposition made in the *Notice* that allotments and full facilities of stations meeting the spacing requirements be fully protected. Several commenters suggest that the service of a short-spaced station be protected in non-short-spaced directions by assuming that the station is operating with full facilities in non-short-spaced directions. However, we must reject this approach because of the substandard and geographically indeterminate service that would be afforded protection beyond the actual contour.¹³ Moreover, we would have no way of accurately predicting where any future contour would be located.¹⁴ Accordingly, the policy concerning the type of protection to be afforded fully spaced and short-spaced FM stations will be adopted as

proposed.¹⁵ For this reason, the rules we adopt today provide for continued use of the minimum spacing requirements, with contour protection to be used only in those situations where the minimum spacing requirements are not met. Applicants proposing to meet the minimum spacing requirements towards an existing or proposed facility need not be concerned with contour protection of that facility. However, if the applicant proposes a new short-spacing or an aggravation of an existing short-spacing not covered under Section 73.213, then the applicant must comply with the contour protection requirements with respect to that facility.¹⁶

35. Because applications processed pursuant to the new rules adopted herein are entitled only to protection based on proposed facilities, applicants for such stations will be required to expressly indicate by an appropriate exhibit in their application that they are to be processed pursuant to these new rules. This will allow immediate identification of the protection to be afforded such applications. Failure to thus indicate that an application is to be processed under these new rules will afford the proposed facility more protection than it is entitled to and unnecessarily restrict other applicants. Therefore, if an applicant requests authorization to operate pursuant to these new rules, an additional element of substantial completeness at tender will be the requirement that an exhibit be submitted intended to demonstrate compliance with the applicable provisions of the new rules. Accordingly, an applicant's failure to submit the appropriate exhibit will result in the return of the application as not substantially complete at tender. We are therefore adding this requirement for an exhibit to our list of tender criteria utilized in evaluating the substantial completeness of applications under the FM "hard look" processing procedures. See *Report and Order* in MM Docket No. 84-750, 50 Fed. Reg. 19936 (1985). Finally, we are adding a question to Section V-B, FCC Form 301 (Application for Authority to Construct or Make Changes in a Commercial Broadcast Station), which will require an engineering study to establish the lack of prohibited overlap of contours involving affected stations. We are making a similar revision in FCC Form 340 (Application for Authority to Construct or Make Changes in a Noncommercial Educational Broadcast Station). In the interim, before the changed forms are available, applicants proposing operation pursuant to the new rules must include, as a supplement to the old form, the Exhibit required in the attachment appended hereto as Appendix C.

Directional antenna performance and certification

36. The comments filed in response to the various technical questions raised in the *Notice* concerning FM directional antenna performance, both practical and theoretical, are not dispositive. As noted above, opinion was divided on the accuracy of field testing of directional antenna performance, regardless of whether it was conducted on site or reduced construction test range scale. Many commenters expressed concern over the need for meticulous installation procedures. A few commenters requested that post-installation field strength proof-of-performance measurements be conducted to ensure that actual performance equalled the manufacturer's predicted performance.

37. The comments also contained little information which would support any amendment of the current requirement pertaining to directional antenna maximum-to-minimum gain (15 dB). Comments on the protection to be afforded vertical and horizontal radiation components, and the amplitude relationship between the two components were also inconclusive. There was some agreement that the 2 dB per 10 degree limit on directional antenna rate-of-gain change should be applicable to all directional antennas used in short-spaced situations.

38. Having carefully considered the comments, we conclude that insufficient justification exists for any major change in the policies and rules currently relating to directional antenna performance. We believe the provisions currently contained in Section 73.316(b) *et seq* generally are sufficient to ensure that the performance of a directional antenna will meet its manufacturer's claims. However, several minor amendments to that rule section appear appropriate as a means of further insuring the predicted directional performance is obtained in reality and because we need precise information to automate our studies of contour protection. Thus, we will require that applications for construction permits which propose directional antennas include the following exhibits: (1) A single composite relative field horizontal plane pattern that encompasses both the horizontal and vertical polarization (rather than separate patterns for horizontal and vertical polarization); (2) A tabulation of the relative field pattern, containing values at least every 10 degrees with additional tabulations for maximas and minimas; (3) A statement that the antenna will be mounted on the antenna tower as recommended by the antenna manufacturer; (4) a statement that the directional antenna will not be mounted on the top of an antenna tower which includes a top-mounted platform larger than the nominal cross-sectional area of the tower in the horizontal plane; and, (5) a statement that no other antennas of any type are mounted on the same tower level as a directional antenna, and that no antenna of any type is mounted within any horizontal or vertical distance specified by the antenna manufacturer as being necessary for proper directional operation. Upon completion of antenna construction, we will require a statement from a licensed surveyor that the antenna has been installed pursuant to the manufacturer's instructions and is in the proper orientation.

39. With regard to another antenna radiation pattern issue, we have concluded that our current policy which limits the rate-of-gain change to 2 dB per 10 degrees should be applied to all future short-spaced directional antenna systems. Most commenters addressing this specification consider it to be appropriate and potentially useful as a means of discouraging and rejecting applications containing exaggerated claims of performance. This matter can always be revisited in the future if further experience suggests it is overly conservative.

40. We will continue to require proofs of performance to establish that directional antennas have the appropriate measured patterns. However, those applicants authorized to employ directional antennas pursuant to the contour protection requirements must establish that the measured patterns for both horizontal and vertical polarization do not exceed the proposed pattern in any direction. The measured patterns will be used only to establish compliance with the terms of the construction permits; they will not be used to determine distances to contours. The pat-

terns authorized by the construction permits will always be used to determine distances to contours for existing facilities.

Calculation of HAAT in the direction of short - spaced stations

41. The current rules for determining the appropriate HAAT in the noncommercial FM service and the Low Power TV service require the use of as many radials as necessary to establish the lack of prohibited overlap. In some cases, only a few radials will be required, while in other cases, such as a valley between two mountains, many radials may be required to accurately establish the lack of prohibited overlap. We are adopting this method for use in the FM broadcast service when contour protection is required. The distance to the pertinent contours is to be calculated along each radial using that radial's individual HAAT and the ERP at this azimuth. This method of determining signal strength must be used for both the signal to be protected (the desired signal) and the signal of the station providing the protection (the interfering signal). However, for purposes of station authorization, the overall HAAT will be computed in accordance with the traditional eight-radial procedure.

42. Protection of stations not authorized pursuant to Section 73.215 shall be computed using the maximum ERP and reference HAAT. The actual HAAT on individual radials must be increased or decreased by the amount that the eight-radial HAAT could be increased or decreased. For example, if a Class C station with 100 kilowatts ERP and an eight-radial HAAT of 350 meters is to be protected based on presumed use of maximum facilities, its contours would be calculated by adding 250 meters (the 600 meter reference HAAT minus the 350 meter actual eight-radial HAAT) to the actual HAAT on each radial used in calculating the distance to the pertinent contours. However, for stations whose authorized facilities exceed the maximum ERP permitted by Section 73.211 of the rules for the standard eight-radial antenna HAAT employed, whether or not authorized pursuant to Section 73.215, the maximum ERP specified in Section 73.211 for the station class shall be used. In these cases, the antenna HAATs in the directions of concern to be used are those that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to the reference HAAT for the applicable station class, without regard to any other restrictions that may apply (e.g. zoning laws, FAA constraints, or application of Section 73.213).

Protected contours for Class B and Class B1 stations in the non - reserved portion of the FM band

43. Because this proceeding proposes to reintroduce, in a limited way, the contour protection method of making assignments affecting the commercial FM service, it is necessary to determine the signal strength of the contour to be protected. We questioned in the *Notice* whether a uniform level of 1 mV/m for all station classes might be appropriate. This is the level used for non-commercial educational FM stations and approximates the level that is, in effect, protected for most of the commercial station classes. Class B and B1 stations in the non-reserved band, however, in effect, receive protection of somewhat lower signal levels, approximately 0.5 mV/m and 0.7 mV/m

respectively. Certainly, treating all station classes on an equal basis by protecting the 1 mV/m contour would be less burdensome from an administrative standpoint.

44. Although Greater Media claims that using a universal 1 mV/m standard would erode Class B FM service, we believe that weak signal, fringe area FM service is more likely to be eroded by the ever increasing radio frequency noise level and multipath interference encountered in urban environments. We originally determined 25 years ago, as Greater Media indicates, that Class B stations should cover a 40 mile radius, and that they should operate with 50 kW maximum instead of 20 kW maximum. At that time, we assumed that this would allow strong signal coverage in the heart of major urban areas and a weaker but still usable signal in the suburban and rural areas beyond.

45. Today, urban areas have expanded, and the 0.5 mV/m signal provided to the outer urban environments may no longer be adequate to provide quality reception. Nevertheless, altering the protected signal levels for Class B and B1 stations in the non-reserved band while maintaining their facilities at current levels could result in some loss of protected coverage area. Because this matter is essentially a peripheral issue and is secondary to the primary intent of this proceeding, we will adopt the protected contour signal levels suggested by the licensees of these stations, namely 0.5 mV/m and 0.7 mV/m, for Class B and Class B1 stations respectively, in the non-reserved band, while recognizing that it may be appropriate to address this issue in greater detail in the future.

Voluntary acceptance of interference

46. The comments are virtually unanimous that licensees should not be allowed to accept any interference beyond that permitted by the Rules currently. We prefer to develop further experience with various methods of limiting interference, such as the use of directional antennas as contemplated in this proceeding. Accordingly, the rules will not be revised to permit acceptance of additional interference.

CONCLUSION

47. In our discussion above, we have attempted to address and resolve the objections of those commenters who are concerned that inappropriate use of FM directional antennas could significantly degrade the quality of the FM service. The rules we are adopting herein are based largely on the many years of positive experience we have gained in the authorization of directional antennas. These successful, long-standing rules and policies have been updated and refined somewhat as a result of the information obtained in this proceeding. We believe they represent a useful but prudent expansion in the role of FM directional antennas in the provision of FM service, and we are confident that not only will this additional use not degrade the quality of FM service, but that it will materially improve it by assisting licensees in obtaining the most desirable antenna sites for the coverage they want to provide. Accordingly, we are convinced that the public interest will be served by the rule amendments we are adopting herein.

Implementation of the new rules

48. Applications involving the use of directional antennas will require considerably more resources to process than others, both from a personnel and computer processing standpoint. Budgetary constraints will severely limit our ability to process any significant number of applications involving directional antennas at this time. We therefore find it necessary to limit temporarily the number of applications we receive that involve short-spacing. We believe that this is best done by temporarily limiting the amount by which applicants may short-space to 8 kilometers (about 5 miles). We believe this limit will enable us to be responsive to the majority of applications which currently require consideration on a waiver basis and it will, moreover, assist us in identifying any unforeseen problems in the evaluation of these applications. Consistent with this short-term necessity, we will not consider applications involving greater amounts of short-spacing at this time. This temporary policy is stated in a Note following the table in new paragraph 73.215(e) of the Rules. Authority is delegated to the Chief, Mass Media Bureau to issue an Order to remove this Note when it is no longer necessary.

49. Also, pending the outcome of our proposal in MM Docket No. 88-375¹⁷ to increase the maximum power of Class A FM stations to 6 kW, we will not accept applications which involve contour protection based on the current 3 kW Class A power limit. Because such applications could preclude the intended benefits of the power increase proposal for individual Class A stations, it would clearly be inappropriate to accept them until a decision concerning Class A power is final. However, we will accept applications based on the presumed use of an ERP of 6 kW and an antenna HAAT of 100 meters for Class A stations, as the potential preclusive effect of such applications on Class A facilities would be largely avoided. Our purpose in doing this is not to prejudge the outcome of the MM Docket No. 88-375 proceeding, but merely to preserve our options and the potential benefits intended by that proceeding. However, Class A applicants applying under Section 73.215 should be aware that they will be protected only to their actual facilities and therefore may not be able to take advantage of any rule changes that the Commission may adopt in MM Docket No. 88-375. We are adding a Note concerning this policy after paragraph 73.215(b)(2)(ii) of the rules we are adopting. This Note will be removed when final action concerning the Class A power increase is taken.

50. Applications submitted prior to the effective date of the rules we adopt today that include a request for waiver of Section 73.207 will be processed under the current minimum spacing rules only and not under the new contour protection rules. Applications submitted on or after the effective date must specify whether they are to be processed under the new contour protection rules. Amendments submitted on or after the effective date (including amendments to applications on file prior to the effective date) also must specify whether they are to be processed under the new contour protection rules. We believe that it would be improper for us to presume, without an explicit election, that an applicant chooses processing under the new contour protection rules, as this entails some risk that future modifications of its facilities might become restricted as the result of protection of actual, rather than maximum, facilities. Therefore, in the

absence of a specific request by the applicant, including the required supplementary exhibit (*see* paragraph 35, *supra*, and Appendix C), we will presume that the applicant intends the application to be processed under the minimum spacing rules only and not under the new contour protection rules.

51. In accordance with the Regulatory Flexibility Act of 1980 (Pub. L. 96-354), a final regulatory flexibility analysis follows:

FINAL REGULATORY FLEXIBILITY ANALYSIS

I. Need and purpose of this action:

This action will provide applicants for facilities in the FM Broadcast Service with greater flexibility in the selection of transmitter/antenna sites, thereby permitting them to more precisely locate their signal coverage over areas of greater demographic interest. In some cases, it will permit the installation of facilities that would not be possible due to the lack of available sites at fully spaced locations.

II. Summary of Issues Raised by the Public Comments in Response to the Initial Regulatory Flexibility Analysis:

No comments or reply comments were received which address the Initial Regulatory Flexibility Analysis.

III. Significant Alternatives Considered and Rejected:

No other alternatives are available that would give licensees the flexibility in transmitter site location intended by this proceeding.

52. The Secretary shall send a copy of this Report and Order, including the Final Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 603(a) of the Regulatory Flexibility Act (Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. Section 601 *et seq.*, (1981)).

PAPERWORK REDUCTION ACT STATEMENT

53. The decisions contained herein have been analyzed with respect to the Paperwork Reduction Act of 1980, and has been found to impose a new or modified information collection requirement on the public. Implementation of any new or modified requirement will be subject to approval by the Office of Management and Budget as prescribed by the Act.

ORDERING CLAUSE

54. Accordingly, IT IS ORDERED THAT effective April 14, 1989, or upon Office of Management and Budget approval of amendments to FCC Form 301 and FCC Form 340, whichever is later, Part 73 of the Commission's Rules IS AMENDED as set forth in Appendix A below. This action is taken pursuant to authority contained in Sections 4 and 303 of the Communications Act of 1934, as amended. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX A

1. The authority citation for Part 73 continues to read as follows:

Authority: 47 U.S.C. 154 and 303.

2. 47 CFR 73.207 is amended by revising paragraph (a) to read as follows:

§ 73.207 Minimum distance separation between stations.

(a) Except for assignments made pursuant to §§73.213 or 73.215, FM allotments and assignments must be separated from other allotments and assignments on the same channel (co-channel) and on nearby adjacent channels by not less than the minimum distances specified in paragraphs (b) and (c) of this section. The Commission will not accept petitions to amend the Table of Allotments, applications for new stations, or applications to change the channel or location of existing assignments unless transmitter sites meet the minimum distance separation requirements of this section, or such applications conform to the requirements of §§73.213 or 73.215. However, applications to modify the facilities of stations with short-spaced antenna locations authorized pursuant to prior waivers of the distance separation requirements may be accepted, provided that such applications propose to maintain or improve that particular spacing deficiency. Class D (secondary) assignments are subject only to the distance separation requirements contained in paragraph (b)(3) of this section. (See §73.512 for rules governing the channel and location of Class D (secondary) assignments.)

* * * * *

3. 47 CFR 73.209 is amended by revising paragraph (b) and removing paragraph (c), as follows.

§ 73.209 Protection from interference.

* * * * *

(b) The nature and extent of the protection from interference afforded FM broadcast stations operating on Channels 221-300 is limited to that which results when assignments are made in accordance with the rules in this subpart.

4. A new section 47 CFR 73.215 is added, to read as follows:

§ 73.215 Contour protection for short - spaced assignments.

The Commission will accept applications that specify short-spaced antenna locations (locations that do not meet the domestic co-channel and adjacent channel minimum distance separation requirements of §73.207): *provided that*, such applications propose contour protection, as defined in paragraph (a) of this section, with all short-spaced assignments, applications and allotments, and meet the other applicable requirements of this section. Each application to be processed pursuant to this section must specifically request such processing on its face, and must include the necessary exhibit to demonstrate that the requisite contour protection will be provided. Such applications may be granted when the Commission determines that such action would serve the public interest, convenience, and necessity.

(a) *Contour protection.* Contour protection, for the purpose of this section, means that on the same channel and on the first, second and third adjacent channels, the predicted interfering contours of the proposed station do not overlap the predicted protected contours of other short-spaced assignments, applications and allotments, and the predicted interfering contours of other short-spaced assignments, applications and allotments do not overlap the predicted protected contour of the proposed station.

(1) The protected contours, for the purpose of this section, are defined as follows. For all Class B and B1 stations on Channels 221 through 300 inclusive, the F(50,50) field strengths along the protected contours are 0.5 mV/m (54 dBu) and 0.7 mV/m (57 dBu), respectively. For all other stations, the F(50,50) field strength along the protected contour is 1.0 mV/m (60 dBu).

(2) The interfering contours, for the purpose of this section, are defined as follows. For co-channel stations, the F(50,10) field strength along the interfering contour is 20 dB lower than the F(50,50) field strength along the protected contour for which overlap is prohibited. For first adjacent channel stations (± 200 kHz), the F(50,10) field strength along the interfering contour is 6 dB lower than the F(50,50) field strength along the protected contour for which overlap is prohibited. For second adjacent channel stations (± 400 kHz), the F(50,10) field strength along the interfering contour is 20 dB higher than the F(50,50) field strength along the protected contour for which overlap is prohibited. For third adjacent channel stations (± 600 kHz), the F(50,10) field strength along the interfering contour is 40 dB higher than the F(50,50) field strength along the protected contour for which overlap is prohibited.

(3) The locations of the protected and interfering contours of the proposed station and the other short-spaced assignments, applications and allotments must be determined in accordance with the procedures of paragraphs (c), (d)(2) and (d)(3) of §73.313, using data for as many radials as necessary to accurately locate the contours.

(b) Applicants requesting short-spaced assignments pursuant to this section must take into account the following factors in demonstrating that contour protection is achieved:

(1) The ERP and antenna HAAT of the proposed station in the direction of the contours of other short-spaced assignments, applications and allotments. If a directional antenna is proposed, the pattern of that antenna must be

used to calculate the ERP in particular directions. See §73.316 for additional requirements for directional antennas.

(2) The ERP and antenna HAAT of other short-spaced assignments, applications and allotments in the direction of the contours of the proposed station. The ERP and antenna HAATs in the directions of concern must be determined as follows:

(i) For vacant allotments, contours are based on the presumed use, at the allotment's reference point, of the maximum ERP that could be authorized for the station class of the allotment, and antenna HAATs in the directions of concern that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to the reference HAAT for the station class of the allotment.

(ii) For existing stations that were not authorized pursuant to this section, including stations with authorized ERP that exceeds the maximum ERP permitted by §73.211 for the standard eight-radial antenna HAAT employed, and for applications not requesting authorization pursuant to this section, contours are based on the presumed use of the maximum ERP for the applicable station class (as specified in §73.211), and the antenna HAATs in the directions of concern that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to the reference HAAT for the applicable station class, without regard to any other restrictions that may apply (e.g. zoning laws, FAA constraints, application of §73.213).

NOTE: Until further Notice, contours for existing Class A assignments, Class A applications not requesting authorization pursuant to this section, and Class A allotments are based on the presumed use of an ERP of 6000 Watts, and antenna HAATs in the directions of concern that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to 100 meters. This temporary provision will be removed after the final resolution of proposals in MM Docket No. 88-375.

(iii) For stations authorized pursuant to this section, except stations with authorized ERP that exceeds the maximum ERP permitted by §73.211 for the standard eight-radial antenna HAAT employed, contours are based on the use of the authorized ERP in the directions of concern, and HAATs in the directions of concern derived from the authorized standard eight-radial antenna HAAT. For stations with authorized ERP that exceeds the maximum ERP permitted by §73.211 for the standard eight-radial antenna HAAT employed, authorized under this section, contours are based on the presumed use of the maximum ERP for the applicable station class (as specified in §73.211), and antenna HAATs in the directions of concern that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to the reference HAAT for the applicable station class, without regard to any other restrictions that may apply.

(iv) For applications containing a request for authorization pursuant to this section, except for applications to continue operation with authorized ERP that exceeds the maximum ERP permitted by §73.211 for the standard eight-radial antenna HAAT employed, contours are based on the use of the proposed ERP in the directions of concern, and antenna HAATs in the directions of concern derived from the proposed standard eight-radial antenna

HAAT. For applications to continue operation with an ERP that exceeds the maximum ERP permitted by §73.211 for the standard eight-radial HAAT employed, if processing is requested under this section, contours are based on the presumed use of the maximum ERP for the applicable station class (as specified in §73.211), and antenna HAATs in the directions of concern that would result from a non-directional antenna mounted at a standard eight-radial antenna HAAT equal to the reference HAAT for the applicable station class, without regard to any other restrictions that may apply.

NOTE: Applicants are cautioned that the antenna HAAT in any particular direction of concern will not usually be the same as the standard eight-radial antenna HAAT or the reference HAAT for the station class.

(c) Applications submitted for processing pursuant to this section are not required to propose contour protection of any assignment, application or allotment for which the minimum distance separation requirements of §73.207 are met, and may, in the directions of those assignments, applications and allotments, employ the maximum ERP permitted by §73.211 for the standard eight-radial antenna HAAT employed.

(d) Stations authorized pursuant to this section may be subsequently authorized on the basis of compliance with the domestic minimum separation distance requirements of §73.207, upon filing of an FCC Form 301 or FCC Form 340 (as appropriate) requesting a modification of authorization.

(e) The Commission will not accept applications that specify a short-spaced antenna location for which the following minimum distance separation requirements, in kilometers (miles), are not met:

Relation	Co - channel	200 kHz	400/600 kHz
A to A	82 (51)	42 (26)	25 (16)
A to B1	119 (74)	66 (41)	46 (29)
A to B	143 (89)	88 (55)	67 (42)
A to C2	143 (89)	84 (52)	53 (33)
A to C1	178 (111)	111 (69)	73 (45)
A to C	203 (126)	142 (88)	93 (58)
B1 to B1	138 (86)	88 (55)	48 (30)
B1 to B	175 (109)	114 (71)	69 (43)
B1 to C2	163 (101)	105 (65)	55 (34)
B1 to C1	200 (124)	134 (83)	74 (46)
B1 to C	233 (145)	169 (105)	105 (65)
B to B	211 (131)	145 (90)	71 (44)
B to C2	200 (124)	134 (83)	69 (43)
B to C1	241 (150)	169 (105)	77 (48)
B to C	270 (168)	195 (121)	105 (65)
C2 to C2	163 (101)	105 (65)	55 (34)
C2 to C1	196 (122)	130 (81)	74 (46)
C2 to C	224 (139)	169 (105)	105 (65)
C1 to C1	224 (139)	158 (98)	79 (49)
C1 to C	249 (155)	188 (117)	105 (65)
C to C	270 (168)	209 (130)	105 (65)

NOTE: Until further Notice, the Commission will not accept applications that specify short-spaced antenna locations pursuant to this section wherein the proposed distance separation is less than the normally required distance separation in §73.207 by more than 8 kilometers (5 miles). This temporary restriction will be removed when the Commission determines that available resources

are sufficient to allow the timely processing of additional applications proposing short-spaced locations using contour protection.

5. 47 CFR 73.311 is amended by revising paragraph (a) and adding a new paragraph (b)(4), as follows:

§ 73.311 Field strength contours.

(a) Applications for FM broadcast authorizations must show the field strength contours required by FCC Form 301 or FCC Form 340, as appropriate.

(b) * * *

(4) In determining compliance with §73.215 concerning contour protection.

6. 47 CFR 73.316 is amended by revising paragraphs (b) and (c) as follows:

§ 73.316 FM antenna systems.

* * * * *

(b) *Directional antennas.* A directional antenna is an antenna that is designed or altered for the purpose of obtaining a non-circular radiation pattern.

(1) Directional antennas that have a ratio of maximum to minimum radiation in the horizontal plane of more than 15 dB will not be authorized.

(2) Directional antennas that have a radiation pattern which varies more than 2 dB per 10 degrees of azimuth will not be authorized.

(c) * * *

(1) A complete description of the proposed antenna system, including the manufacturer and model number of the proposed directional antenna. It is not sufficient to label the antenna with only a generic term such as "dipole". A specific model number must be provided. In the case of individually designed antennas with no model number, or in the case of a composite antenna composed of two or more individual antennas, the antenna must be described as a "custom" or "composite" antenna, as appropriate. A full description of the design of the antenna must also be submitted.

(2) A relative field horizontal plane pattern of the proposed directional antenna. A single pattern encompassing both the horizontal and vertical polarization is required, rather than separate patterns for horizontal and vertical polarization. A value of 1.0 must be used to correspond to the direction of maximum radiation. The plot of the pattern must be oriented such that 0° corresponds to the direction of maximum radiation or alternatively, in the case of an asymmetrical antenna pattern, the plot must be oriented such that 0° corresponds to the actual azimuth with respect to true North. The horizontal plane pattern must be plotted to the largest scale possible on unglazed letter-size polar coordinate paper (main engraving approximately 7" x 10") using only

scale divisions and subdivisions of 1, 2, 2.5, or 5 times 10 to the Nth power. Values of field strength less than 10% of the maximum field strength plotted on that pattern must be shown on an enlarged scale. In the case of a composite antenna composed of two or more individual antennas, the pattern required is that for the composite antenna, not the patterns for each of the individual antennas.

(3) A tabulation of the relative field pattern required in paragraph (c)(2) of this section. The tabulation must use the same zero degree reference as the plotted pattern, and must contain values for at least every

10°. In addition, tabulated values of all maximas and minimas, with their corresponding azimuths, must be submitted.

(4) Sufficient vertical patterns to indicate clearly the radiation characteristics of the antenna above and below the horizontal plane. Complete information and patterns must be provided for angles of $\pm 10^\circ$ from the horizontal plane and sufficient additional information must be included on that portion of the pattern lying between $+10^\circ$ and the zenith and -10° and the nadir, to conclusively demonstrate the absence of undesirable lobes in these areas. The vertical plane pattern must be plotted on rectangular coordinate paper with reference to the horizontal plane. In the case of a composite antenna composed of two or more individual antennas, the pattern required is that for the composite antenna, not the patterns for each of the individual antennas.

(5) A statement that the antenna will be mounted on the top of an antenna tower recommended by the antenna manufacturer, or will be side-mounted on a particular type of antenna tower in accordance with specific instructions provided by the antenna manufacturer.

(6) A statement that the directional antennas will not be mounted on the top of an antenna tower which includes a top-mounted platform larger than the nominal cross-sectional area of the tower in the horizontal plane.

(7) A statement that no other antennas of any type are mounted on the same tower level as a directional antenna, and that no antenna of any type is mounted within any horizontal or vertical distance specified by the antenna manufacturer as being necessary for proper directional operation.

(8) In the case of applications for license upon completion of antenna construction, a statement from a licensed surveyor that the antenna has been installed pursuant to the manufacturer's instructions and is in the proper orientation.

* * * * *

APPENDIX B

List of Commenters

Hale Communications, Inc.
WGNS (AM) Radio Station
Ronald J. Grandmaison, P.E., Consulting Engineer
Doug C. McDonell, Technical
Susquehanna Radio Corp.
Hammett & Edison, Inc., Consulting Engineers
Karl D. Lahm, P.E., & Associates, Consulting

Engineers
Winfas, Inc.
Serge Bergen, Engineering Consultant
New Jersey Class A Broadcasters Association
Redwood Empire Stereocasters
Vir James, P.C., Broadcast Engineering Consultants
Hudson Group Limited Partnership of Pennsylvania
J.J. Taylor Companies, Inc.
WEDR, Inc. (FM radio station)
SIS Sound, Inc.
WIBF (FM) Radio Station
Scripps Howard Broadcasting Company
Fuller-Jeffrey Broadcasting Companies, Inc.
Louisiana Association of Broadcasters
Association of Federal Communications Consulting
Engineers
Theodore G. Hammond
KRRV, AM and FM Radio stations
National Association of Broadcasters
Greater Media, Inc.
Bonneville International Corporation
Roy E. Henderson
Shamrock Broadcasting, Inc.
Association for Broadcast Engineering Standards, Inc.
Crain Broadcasting, Inc.
Infinity Broadcasting Corporation
Capitol Broadcasting Corporation
Association of Maximum Service Telecasters, Inc.
Edens Broadcasting, Inc.
Eastern Broadcasting Corporation
Massachusetts Class A Broadcasters Association
Kevin M. Fitzgerald
New City Communications Inc.
Central Broadcasting Company
Great Southern Broadcasting Company, Inc.

List of Reply Commenters

Chapman S. Root Revocable Trust
Greater Media, Inc.
Massachusetts Class A Broadcasters Association
Mid-Ohio Communications, Inc.
J.J. Taylor Companies, Inc.
Public Broadcasting Service and the
National Association of Public Television Stations

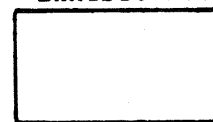
A P P E N D I X C

Applicants requesting processing pursuant to 47 C.F.R. §73.215 must submit this page and the required exhibits with FCC Form 301 ("Application for Authority to Construct or Make Changes in a Commercial Broadcast Station"), or FCC Form 340 ("Application for Authority to Construct or Make Changes in a Noncommercial Educational Broadcast Station"), as appropriate.

Authorization Pursuant
to 47 C.F.R. §73.215

If authorization pursuant to 47 C.F.R. §73.215 is requested, attach as an Exhibit a complete engineering study to establish the lack of prohibited overlap of contours involving affected stations. The engineering study must include the following:

Exhibit No.



(a) Protected and interfering contours, in all directions (360°), for the proposed operation.

(b) Protected and interfering contours, over pertinent arcs, of all short-spaced assignments, applications and allotments, including a plot showing each transmitter location, with identifying call letters or file numbers, and indication of whether facility is operating or proposed. For vacant allotments, use the reference coordinates as transmitter location.

(c) When necessary to show more detail, an additional allocation study utilizing a map with a larger scale to clearly show prohibited overlap will not occur.

(d) A scale of kilometers and properly labeled longitude and latitude lines, shown across the entire exhibit(s). Sufficient lines should be shown so that the location of the sites may be verified.

(e) The official title(s) of the map(s) used in the exhibit(s).

NOTE: Applicants not requesting processing pursuant to 47 C.F.R. §73.215 do not need to submit this page with their application.

FOOTNOTES

¹ The *Notice* stated that a proposal concerning short-spaced I.F.-related stations, if any, would be made subsequent to a decision in MM Docket No. 86-144 (see "Review of Technical Parameters for FM Allocation Rules of Part 73, Subpart B, FM Broadcast Stations", 3 FCC Rcd 1661 (1988), 53 Fed. Reg. 10259, March 30, 1988). Because the technical issues involved in I.F. interference may differ from those discussed herein (e.g., the greater number of stations for which reception could be impaired), and because these issues have not received public scrutiny and comment, we will continue to require I.F.-related stations to meet the separation distances specified in §73.207. Applicants seeking a waiver of the I.F. separation requirements of §73.207 must continue to show that fully-spaced or less short-spaced sites are not available and that grant of the waiver is in the public interest. Demonstrations that predicted contours will not overlap will not constitute grounds for a waiver.

² See *Notice of Inquiry*, 2 FCC Rcd 3141 (1987), 53 Fed. Reg. 20430, June 1, 1987. Originally comments and reply comments were due July 17, 1987 and August 3, 1987, respectively, but the comment and reply comment periods were extended by *Order* (2 FCC Rcd 5673 (1987), 52 Fed. Reg. 27570, July 22, 1987) to August 31, 1987, and September 15, 1987, respectively.

³ See Table A in Section 73.207(b)(1) of the Commission's Rules.

⁴ The use of directional FM antennas is already provided by the Rules to a limited extent (see Section 73.316). They may be used by commercial FM licensees for reasons other than to justify short spacing, such as to concentrate signals over desired areas. Grandfathered short-spaced stations use directional antennas to permit facility modifications (see Section 73.213). Also, directional antennas are commonly used by non-commercial educational FM stations to provide protection to the service contours of other co-channel and adjacent channel stations. As a result, about 10% of all FM stations currently employ directional antennas. Thus, they cannot be considered a novelty in the FM broadcast service.

⁵ See *Notice of Proposed Rule Making*, 3 FCC Rcd 1820 (1988), 53 Fed. Reg. 12779, April 19, 1988. Original comment and reply comment deadlines of May 27, 1988 and June 27, 1988, respectively, were extended by *Order* (53 Fed. Reg. 22036, June 13, 1988) to August 5, 1988, and September 5, 1988, respectively.

⁶ For example, we did not contemplate the use of directional antennas as a means of justifying an increase of facilities to a higher class (see reply comments of the Massachusetts Class A Broadcasters' Association).

⁷ We would further note that the ability to upgrade probably becomes less important as the FM service matures. Many stations able to upgrade have already done so in response to various marketplace and regulatory incentives.

⁸ Some of the comments appear to envision that short-spaced stations would be subject to contour protection requirements only in the directions of the other short-spaced stations, the inference being that such stations would be afforded protection to maximum facilities in non-short-spaced directions. However, this was not our intent in raising this matter in the *Notice*. While this action could afford some short-spaced stations with an improved potential for upgrade, it would reduce the incentive to install the best possible facilities initially. This approach also would involve considerable administrative complexity, since we would need to keep track of what area is actually receiving service, and what area is potentially capable of receiving service. Accordingly, we continue to believe that the best procedure is to protect actual short-spaced (or directional) facilities. However, when two facilities are not short-spaced to each other, even if

both are otherwise subject to contour protection pursuant to §73.215, meeting the minimum spacing requirements of §73.207 is sufficient, regardless of whether there is actual contour overlap between them.

⁹ Because there is no lower class, Class A stations would theoretically be permitted to short-space by an amount determined by their minimum permitted facilities. In practice, however, this flexibility may be limited by the requirement that they be able to provide city-grade service over their principal community of license.

¹⁰ Short-spacings of less than 0.5 km are not cognizable and therefore do not require a waiver. See §73.208(c). See also Ronette Communications Corp., 51 RR 2nd 229, Broadcast Bureau, 1982.

¹¹ The contour protection criteria similar to that specified for the non-commercial service, but modified to include appropriate limits for Class B and Class B1 stations, were given in Appendix C to the *Notice*. We would point out that the co-channel and first, second and third adjacent channel desired-to-undesired (D/U) contour protection ratios applicable to the commercial and non-commercial services are the same, with the exception of the ratio applied to the second adjacent channel. In the commercial service it is -40 dB and in the non-commercial service it is -20 dB. Because the non-commercial standard is the more stringent, we will apply it to future commercial authorizations that are contour protection dependent.

¹² In this and in the subsequent examples, only co-channel spacing requirements are discussed, since they offer the greatest potential for change. However, it is important to remember that smaller reductions would be permitted in the case of adjacent channel separations. As a practical matter, the need to meet adjacent channel spacing requirements may often constrain the amount of co-channel short-spacing that is possible.

¹³ Adopting this suggestion would also impose significant administrative burdens on our processing staff due to the need to determine the locations of the actual and potential contours and to store them in our computers. (See also Footnote 8, *supra*.)

¹⁴ We emphasize that an application that does not meet the minimum distance separation requirements of §73.207 to another assignment will be treated as an encroaching station regardless of the status of the assignment being encroached upon.

¹⁵ Stations licensed as restricted §73.215 facilities which subsequently meet all of the minimum separation requirements for all co-channel and adjacent channel facilities, either through modification of their own facilities or through modification of the co-channel or adjacent channel facilities, may regain status as §73.207 facilities by applying to the Commission using FCC Form 301 or FCC Form 340, as appropriate.

¹⁶ For example, if an applicant must consider ten other facilities, and would be short-spaced to one of the ten, the applicant must demonstrate contour protection only with respect to the one with which it would be short-spaced; meeting the minimum spacing requirements is sufficient with respect to the other nine.

¹⁷ See *Notice of Proposed Rule Making*, MM Docket No. 88-375, 3 FCC Rcd 5941 (1988), 53 Fed. Reg. 38743, October 3, 1988.

**DISSENTING STATEMENT
OF
COMMISSIONER JAMES H. QUELLO**

In Re: Amendment of Part 73 of the Commission's Rules to Permit Short-Spaced FM Station Assignment by Using Directional Antennas.

Consistent with my separate statement to the *Notice of Proposed Rulemaking* in this proceeding, I must disagree with the majority's decision to authorize short-spaced facilities in the FM band.

The Commission's decision ultimately rests on the concept that we can achieve equivalent contour protection for FM stations. This is precisely the method now employed in the AM band. As the level of interference in the AM band demonstrates, contour protection has not served this Commission well. I firmly believe that this decision will increase congestion and decrease the quality of service to the public. Indeed, the item acknowledges that there will be an average reduction in current spacing requirements of about 14 percent. Moreover, because stations employing short spacing techniques will be protected only to their contours, the flexibility inherent in the existing table of allotments will be lost.

I fully recognize that the item does not propose to change the table of allotments today. However, once numerous licensees take advantage of this proposal, you have in effect reallocated much of the existing band. I doubt it will be very long before short-spacing becomes an allotment tool. This proposal goes far beyond present use of short-spaced facilities in the noncommercial FM band. It is a first step toward elimination of the table of allotments.

The site problems confronting radio broadcasters today are very real. Rather than opening the floodgates, I would have preferred to adopt a case-by-case approach where an applicant seeking to short-space its antenna would be required to demonstrate that it has lost its site due to zoning changes, loss of land or other circumstances beyond its control. I believe this approach would have properly balanced both the need for flexibility and respect for the table of allotments.

**SEPARATE STATEMENT
OF
COMMISSIONER PATRICIA DIAZ DENNIS**

In Re: Amendment of Part 73 of the Commission's Rules to Permit Short-Spaced FM Station Assignment by Using Directional Antennas.

I support this decision because it represents a measured response to the problems FM licensees have in finding suitable transmitter sites. Licensees now face four regulatory obstacles in selecting a site: zoning restrictions, air safety regulations, our principal city coverage rule, and our mileage separation rules. This decision relaxes the mileage separation rules and thereby gives licensees more flexibility.

The proposal in this proceeding was far-reaching; today's decision is much more conservative. We have *not* reduced the protection granted to Class B and B1 stations. We are *not* using directional antennas as an allotment

tool; we will continue to make new allotments only if they fully comply with our mileage separation rules. We are *not* allowing unlimited short-spacing. Licensees will be required to meet the mileage separations applicable to the next lower class of stations. In addition, we have discouraged casual short-spacing by providing that short-spaced stations, unlike other stations, will receive protection only for their actual facilities.

Directional antennas are hardly a new idea. We have authorized them in the non-commercial FM band with success. We authorize them here in a measured way. This modest change in our rules will not lead to the "AM-ization" of the FM band. Instead, it will give existing licensees more options in choosing sites and ensure the continuation of excellent FM service with little or no additional interference.